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(54) **METHOD, SYSTEM, AND PROGRAM FOR
MAGNIFYING CONTENT DOWNLOADED
FROM A SERVER OVER A NETWORK**

(75) Inventors: **Dawn Marie Canelones**, Cedar Park,
TX (US); **Scott Harvey Demsky**,
Austin, TX (US); **Rabindranath Dutta**,
Austin, TX (US); **Kelvin R. Lawrence**,
Round Rock, TX (US)

(73) Assignee: **International Business Machines
Corporation**, Armonk, NY (US)

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(52) **U.S. Cl.** **345/660**; 707/10

(58) **Field of Search** 345/660, 661,
345/2.1; 707/10, 104.1; 358/1.18

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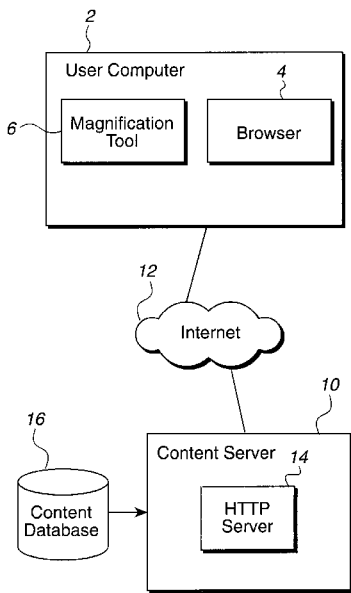
Primary Examiner—Michael Razavi
Assistant Examiner—Ryan Yang

(74) *Attorney, Agent, or Firm*—David W. Victor; Konrad
Raynes Victor & Mann

(57) **ABSTRACT**

Disclosed is a system, method, and program for magnifying
displayed content downloaded from a server over a network.
Information is received indicating selection of a region of
the displayed content to magnify. A determination is made of
at least one region of the selected region including image
content. The server maintains a high resolution file version
and a low resolution file version of the image content. A
determination is then made as to whether the selected image
content from the displayed image file is the low resolution
file version. If so, a command is generated to retrieve from
the server specific byte locations from the high resolution
file version including the image content in the selected
region. The specified bytes are less than all the image data
bytes in the high resolution version of the file if the image
content in the selected region comprises less than all of the
image content maintained in the high resolution version of
the file.

30 Claims, 3 Drawing Sheets



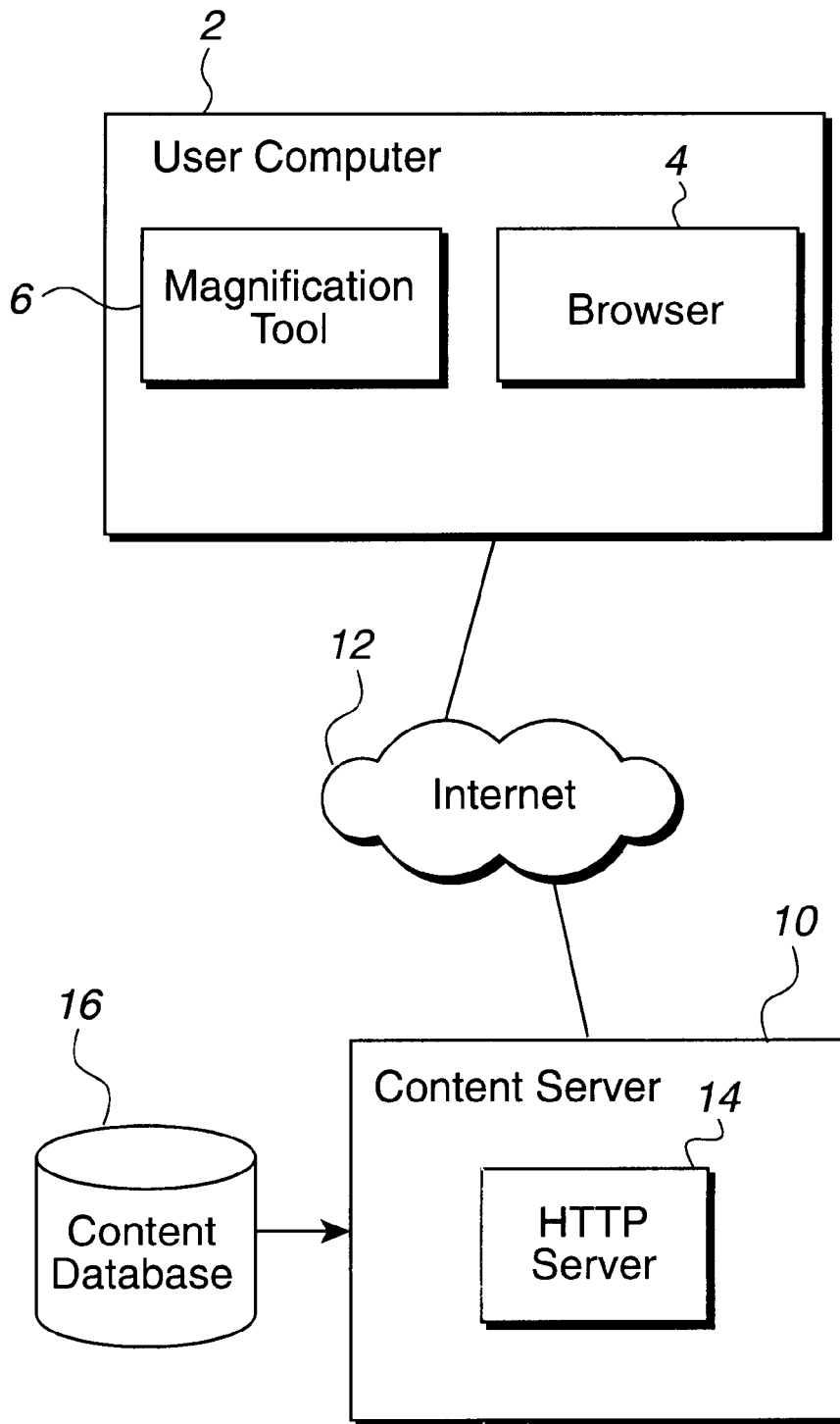
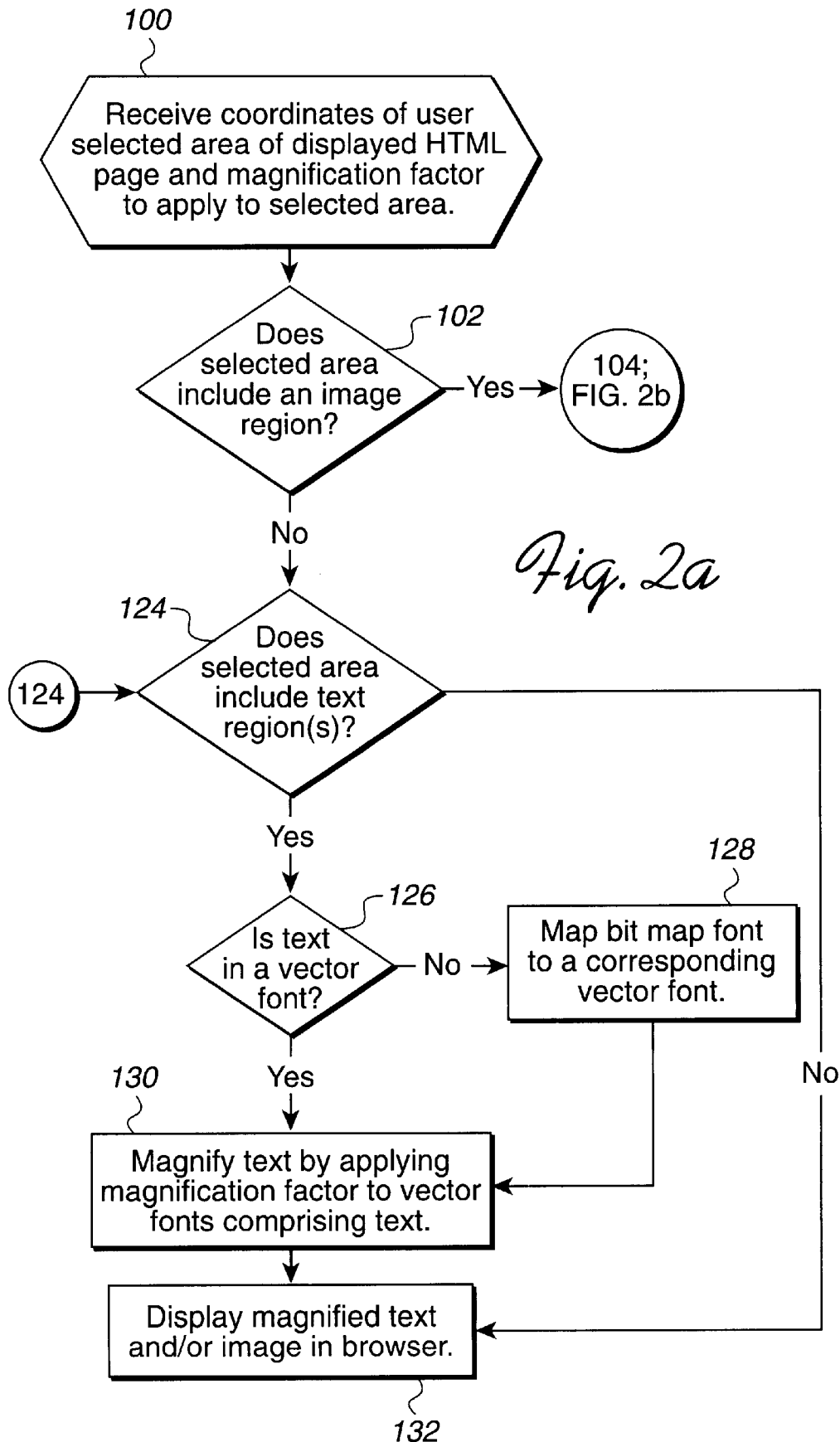


Fig. 1



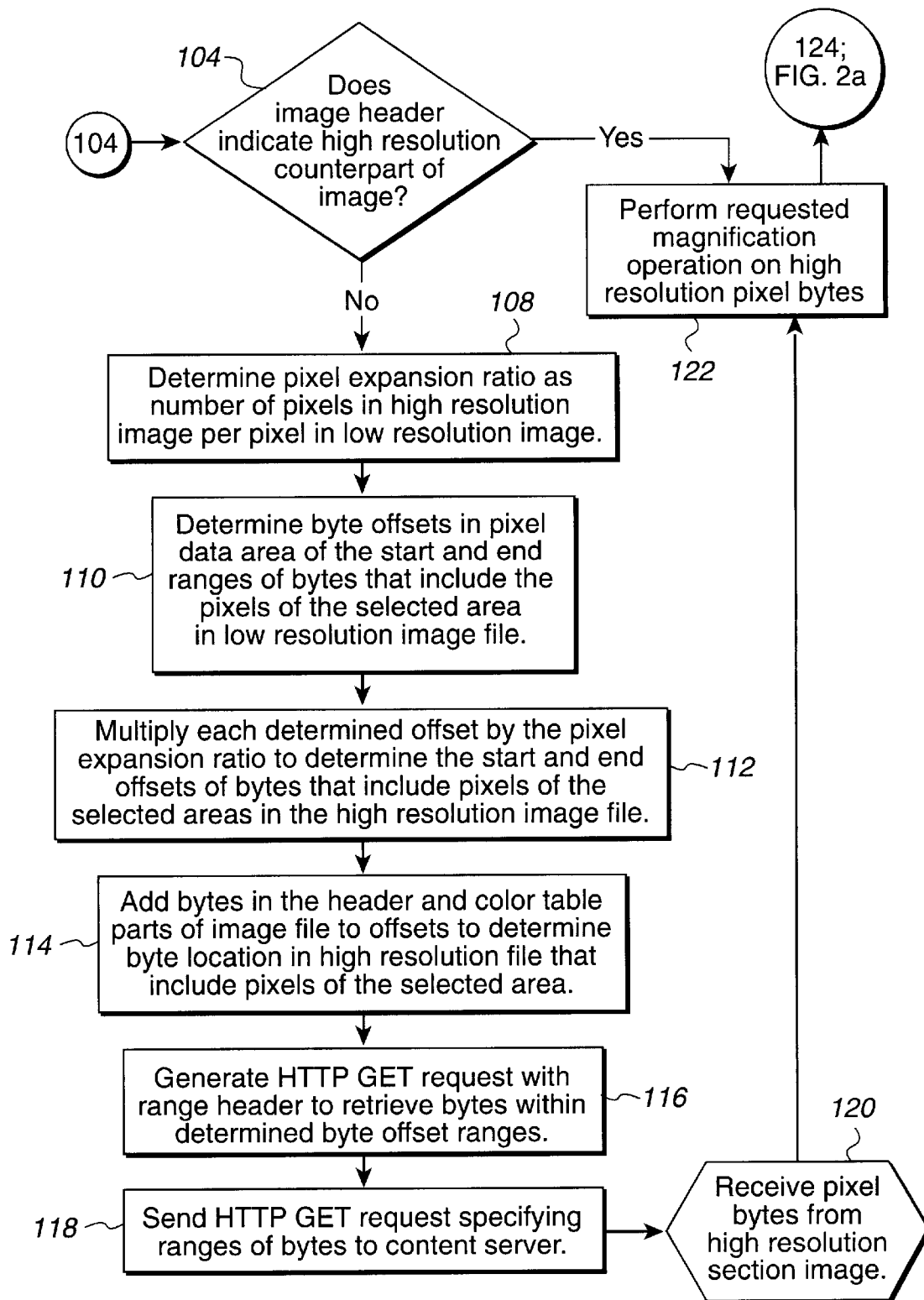


Fig. 2b

METHOD, SYSTEM, AND PROGRAM FOR MAGNIFYING CONTENT DOWNLOADED FROM A SERVER OVER A NETWORK

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method, system, and program for magnifying displayed content downloaded from a server over a network and, in particular, displayed content including images and text.

2. Description of the Related Art

One of the rapidly expanding sources of information and documentation is the "World Wide Web" (WWW) or Internet. Many documents that are available on the Web are images. Images generally are substantially larger files than text files and take longer to download due to the larger file size of images and the limitations of Internet bandwidth. Network delays resulting from overloading network servers or the communication lines are one of the major customer complaints about network access.

One of the most popular image viewing tools is a magnification tool which allows the user to enlarge or reduce the size of the image. However, Internet content providers that provide images that users may want to magnify face a dilemma. If they want to reduce download times, then they must limit the resolution of the image users download as a higher resolution image requires more pixels of information, hence creating larger files. However, the lower the resolution of an image, the poorer the image quality as the image is enlarged using a magnification tool. On the other hand, to improve the quality of magnified images, the Internet content provider would have to increase the resolution of the image and, hence, the file size. Increasing the file size to improve resolution during magnification operations will increase network delays to download the files, reduce network bandwidth and result in consumer dissatisfaction with the lengthy download times associated with the content provider's Web site.

One solution to the above dilemma is for the content provider to perform the magnification operations at the server, and then send the image at the requested magnification to the user computer. For instance, Mapquest.com, Inc. allows users to download a section of a map showing a street address. The user using a "Zoom" tool may select to enlarge or reduce the current view of the street map. When the user changes the magnification level, the server is contacted and the new magnification level is downloaded to the user. Thus, any magnification, i.e., expansion or reduction, of the bit map is performed at the content provider (Mapquest) server. In this way, the content provider need not provide the user the highest resolution image of the map, but may initially provide a lower resolution image to reduce delays in download times. If the user wants to enlarge the view, then Mapquest sends a higher resolution magnified view of a smaller area. This further limits the size of the file as the portion of the image enlarged is less than the portion of the image previously viewed. Thus, the overall file size of the image may not increase because the user is not presented a higher resolution view of the entire previous lower resolution image, but is instead provided a higher resolution view of a smaller area of the previous image.

Although the above approach may help limit the file size of the higher resolution image, there are still drawbacks with the server oriented approach where the user must contact the content provider's site to obtain a new magnified level of the

image. First, is that for each change in magnification, the user must contact the service provider's site. This may result in the user experiencing further network delays. Further, performing the zoom operations at the server would increase processing burdens on the server that may overload the server processor, thereby causing delays in responding to Internet document requests that are unrelated to bandwidth issues. Still further, the user may have wanted a magnified view of the entire image area at the high resolution and not a magnified view of a smaller area of the previously viewed image. In such case, the user would have to send further requests to the content provider to obtain an enlarged view of other areas of the previously viewed images not initially returned in response to the magnification request.

Developing techniques for allowing users to better manipulate images is important given that the majority of data being downloaded over the Internet comprises image content and that in many instances users want to enlarge the view of an image. Thus, there is a need in the art to provide an improved method, system, and program for allowing a user to perform magnification operations on images downloaded over the Internet and at the same time minimize network bandwidth usage and processing burdens imposed on the content provider server.

SUMMARY OF THE PREFERRED EMBODIMENTS

To overcome the limitations in the prior art described above, preferred embodiments disclose a system, method, and program for magnifying displayed content downloaded from a server over a network. Information is received indicating a selection of a region of the displayed content to magnify. A determination is made of at least one region of the selected region including image content. The server maintains a high resolution file version and a low resolution file version of the image content. A determination is then made as to whether the selected image content from the displayed image file is the low resolution file version. If so, a command is generated to retrieve from the server specific byte locations from the high resolution file version including the image content in the selected region. The specified bytes are less than all the image data bytes in the high resolution version of the file if the image content in the selected region comprises less than all of the image content maintained in the high resolution version of the file.

In further embodiments, a requested magnification operation is performed on the bytes in the high resolution file version retrieved from the server to magnify image content in the selected region.

In yet further embodiments, a determination is made as to whether the selected region includes both text and image content. If so, a determination is made as to whether the text included in the selected region is in a vector graphics format. If so, a first magnification operation is performed on the bytes from the high resolution file version retrieved from the server to magnify the image content in the selected region. If there are text fonts in the selected region, then a second magnification operation is performed on the fonts in the vector graphic format by manipulating formulas that represent the fonts to magnify the fonts in the selected region.

Still further, if the fonts in the selected region are in a bit map format, a determination is made of a vector font corresponding to the bit map fonts. In such case, the second magnification operation is performed on the corresponding vector font.

Preferred embodiments provide an improved method, system, and program for downloading image content from a

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